

April 18, 2007

**Setting up the Dark Box:**

1. Turn on the control computer
  - a. Username: root
  - b. Password: csi329429
  - c. When warning comes up click on "Log in anyway"
2. Turn on NIM crate
3. Turn on CAMAC crate
4. Turn on Laser: turn the key to 1
5. Set the Laser knobs
  - a. Power: 1000
  - b. Trigger: EXT
  - c. Sync Delay: ref
6. Set filters in laser path to adjust Npe
  - a. Filters should be placed between metal posts directly in front of the MCP
  - b. To insure alignment of the filters turn the laser trigger to 100M, this will allow you to see the beam.
  - c. Turn the laser trigger back to EXT when the filters are aligned.
  - d. Approximate Npe for filters (laser power 1000)

i. w/ preamp

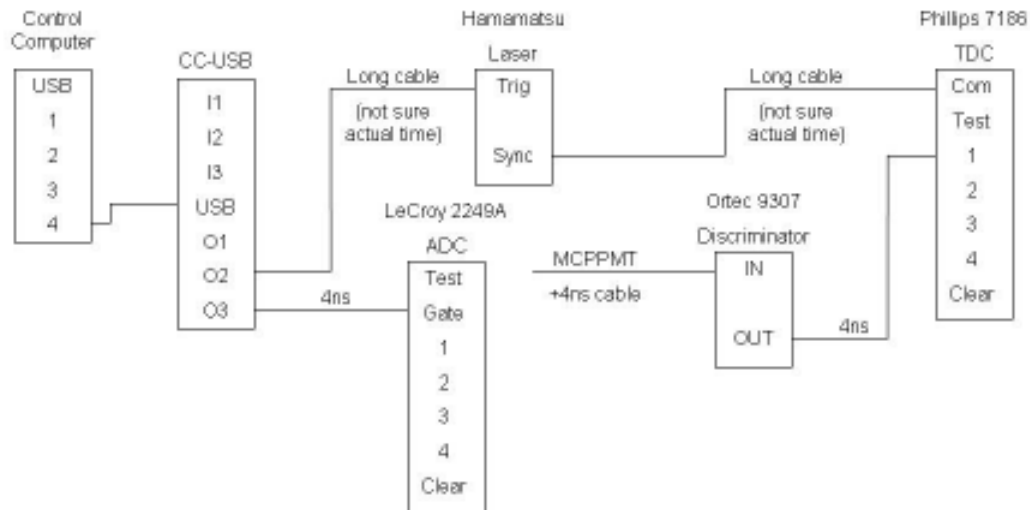
ND Filter	Trigger %	Npe
4.0, 0.2	39.1	0.495937
4.0, 0.1	47.9	0.652005
4.0	58.2	0.872274
3.0, 0.9	77.5	1.491655
3.0, 0.8	85	1.89712
3.0, 0.7	89	2.207275
3.0, 0.6	95.7	3.146555
3.0, 0.5	98.6	4.268698
3.0, 0.4	99.7	5.809143
3.0, 0.2, 0.1	99.8	6.214608
3.0, 0.2	100	

ii. w/o preamp

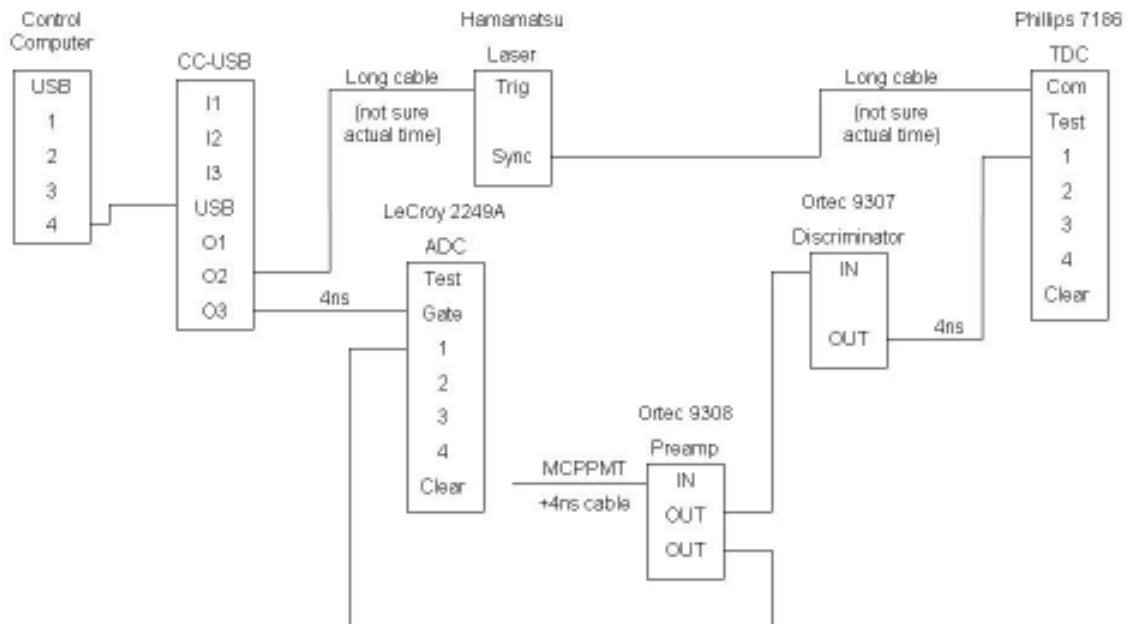
ND Filter	ADC Sig	ADC Mean	Npe (Bob)
2.0, 0.9	2.875	13.55	22.21277883
2.0, 0.8	3.333	18.77	31.71450358
2.0, 0.7	3.32	21.24	40.92916243
2.0, 0.6	3.054	29.17	91.22939458
2.0, 0.5	3.098	33.83	119.245272
2.0, 0.4	3.018	40.32	178.4853503

7. Cover MCP with its cardboard cover and set in laser path
  - a. The cardboard should block the laser diffraction rings while allowing the bright center point of the laser to hit the center of the MCP
  - b. To insure alignment of the MCP turn the laser trigger to 100M, this will allow you to see the beam.
  - c. Turn the laser trigger back to EXT when the MCP is aligned.

8. Connect the high voltage and the output of the MCP to the proper feedthroughs inside the dark box
9. Connect the high voltage supply to the proper feedthrough on the outside of the box
10. Close the dark box and cover with the black cloth
11. Setup should be connected in this manner:
  - a. For runs w/o the preamp
    - i. Separate runs will need to be done to record the TDC and ADC data



- b. For runs w/ Preamp



12. Turn off room lights
13. Turn on High voltage

(DO NOT TURN ON HIGH VOLTAGE WITH THE ROOM LIGHTS ON)

- a. Around 2300V for the MCPPMT
- b. Around 600V for the MAPMT
- c. Allow it to warm up for ~5 min before turning the high voltage on from standby.

#### Viewing on Scope:

14. Channels
  - a. Ch 1 – Sync from laser
  - b. Ch 2 – MCP anode
15. Trigger on Ch 1
16. Run TDC\_7186\_edit.C
  - a. Use 10 events
17. To Save a picture of the screen
  - a. Insert a floppy disk
  - b. Press the round printer button on the lower left side
  - c. When the green light goes off a picture of the screen has been saved in a .BMP format
18. When finished plug in the TDC and allow the program to finish running

#### Taking Data:

19. Open a new terminal on the control computer.
20. Open the folder with all of the programs in it
  - a. At the command prompt type: **cd CAMAC\_3.2/Test/dark\_box**
    - i. This enters the correct folder
  - b. Check log book for next run number.
21. Running the program
  - a. There are several different programs that can be run depending on what equipment you want to run.
  - b. Programs:
    - i. TAC\_1.c
      1. uses only the Ortec 566 TAC and the Ortec AD114 ADC
      2. Output has 1 column
      3. Displays average number of triggered events
        - a. When inputting number of events this is the number of triggered events NOT the total number of events
        - b. The definition of a triggered event is set in the program.
      4. use **make\_ntuple\_TAC\_1.C** to histogram
    - ii. TAC\_2.c
      1. Uses both the Ortec 566 TAC with the Ortec AD114 ADC and the Phillips 7186 TDC
      2. Output has 2 columns
        - a. Column 1: TAC and ADC data
        - b. Column 2: TDC data
      3. Displays average number of triggered events from the TDC

- a. When inputting number of events this is the number of triggered events NOT the total number of events
      - b. The definition of a triggered event is set in the program
    - 4. Use **make\_ntuple\_TAC\_2.C** to histogram
  - iii. TDC\_1.c
    - 1. Uses the Phillips 7186 TDC and the LeCroy ADC
    - 2. Output has 2 columns
      - a. Column 1: TDC data
      - b. Column 2: ADC data
    - 3. Triggered events are not calculated
      - a. When inputting number of events; this is the total number of events.
    - 4. Use **make\_ntuple\_TDC.C** to histogram
  - iv. TDC\_2.c
    - 1. Uses the Phillips 7186 TDC and the LeCroy ADC
    - 2. Output has 2 columns
      - a. Column 1: TDC data
      - b. Column 2: ADC data
    - 3. Displays average number of triggered events from the TDC
      - a. When inputting number of events this is the number of triggered events NOT the total number of events
      - b. The definition of a triggered event is set in the program
    - 4. Use **make\_ntuple\_TDC.C** to histogram
  - c. To run a program **./TAC\_1**
  - d. The programs need to be recompiled if any changes are made
    - i. Type **gcc -o TAC\_1 TAC\_1.C -lxx\_usb**
22. Use root to histogram the results
- a. At the command prompt type: **root -l**
  - b. At the root command prompt type: **.L make\_ntuple\_TAC\_1.C**
  - c. At the root command prompt type: **make\_ntuple()**

### Troubleshooting:

- 23. The TDC value is larger then 4095 (ex. 16711680 )
  - a. The TDC has entered some mode
  - b. To fix:
    - i. End the program
    - ii. Turn off the CAMAC crate
    - iii. Wait 30 seconds
    - iv. Turn on the CAMAC crate
  - c. This often happens when ctrl+C is used to exit a running program
- 24. Double peaks in the TDC histogram
  - a. The thresh hold on the Discriminator is set too low
    - i. The lowest value is 25mV

- ii. Peaks begin to appear when it is set below 50mV
- b. The preamp may be getting saturated
  - i. Decrease the Npe
  - ii. Reduce the voltage
  - iii. Remove the preamp from the system (see the setup diagram w/o preamp)